

REMARKS

Claims 1-21, all the claims pending in the application, stand rejected. Claims 1 and 19-21 are amended. Claims 7-12 and 16-18 are cancelled. New claims 22-28 are added.

As a preliminary matter, Applicants wish to express their gratitude for the courtesy and helpful comments extended by the Examiner during an interview, as conducted on April 26, 2007 and reflected in the Examiner's Interview Summary dated May 2, 2007.

Applicants have endeavored to include in the amended claims structural limitations that address the several points raised by the Examiner. In particular, Applicants have amended the claims to overcome the Section 112 rejections and have further amended the claims to overcome the prior art rejections. In response to the Examiner's suggestions, Applicants have made the following changes to the claims.

First, Applicants have stated the limitation with respect to additives with affirmative and not negative language.

Second, with respect to the ranges of additives that are used, such that the prior art is distinguished, Applicants note that the discussion of additives is presented at pages 11 and 12, where it is stated that:

The cleaning layer according to the present invention may as necessary contain those additives that are usually used, for example, antioxidants, fillers, pigments, colorants, flame retardants, antistatics, and ultraviolet absorbents in amounts within the range in which the effects of the present invention are not deteriorated.

While no specific range is disclosed, Applicants respectfully submit that the limitation in the claim is appropriate, as it clearly distinguishes over a case where abrasives are added intentionally. Moreover, it is clear that the specification at paragraph [0007] teaches a function of the cleaning layer that can be measured and that would be attainable by one skilled in the art following the teachings and examples in the specification.

Third, with respect to the softness of the material in the cleaning layer, Applicants note that there is no parameter for softness, but believe that the Examiner had "initial elastic modulus"

in mind. Thus, Applicants have added that limitation to the claim based on the teaching at page 12 of the original specification.

Fourth, with respect to the Examiner's observation that the claims should specifically mention the use of an acrylic polymer in the composition, Applicants have made that change.

Fifth, with regard to the thickness of the cleaning layer, the Examiner noted that a specific range may be needed. Applicants have added to the claims a recitation that the thickness of the cleaning layer is within a range of 10 to 500 μm , as taught at page 18, lines 20-23.

Sixth, as to the overall effect of the present invention, Applicants have taught the achievement of "unexpected results" as demonstrated by the test results in Tables 1 and 2, and the supporting description in the Examples. In this regard, and consistent with the disclosure at paragraph [0007] of the specification, Applicants have added to all of the claims the limitation that expressly states that neither the foreign material or the cleaning layer material are retained on the tip of the probe.

Finally, then inconsistency in the description at page 29, lines 1-5 of Examples 1-5 in the Tables 1 and 2 at page 28 has been corrected. There it is stated that "no foreign matters remained in the cleaning sheets." In fact, there is no foreign matter on the tips and it does remain in the cleaning sheets. This is an obvious error and no new matter is added.

Drawings

Applicants previously requested acknowledgment of receipt and acceptance of the originally filed drawings. Since the Examiner has not replied, Applicants will assume that the drawings have been received and are acceptable.

Claim Rejections - 35 U.S.C. §112

Claims 1-21 are rejected under 35 U.S.C. §112, first paragraph as failing to comply with the written description requirement. This rejection is traversed for at least the following reasons.

The Examiner objects to two added limitations to claims 1 and 19-21. First, the Examiner notes that the claims contain the added limitation "said cleaning layer does not contain additives that promote wear." Second, the Examiner notes that there is an additional limitation

that the cleaning layer “is adapted to receive penetrating probe needles and remove and retain impurities on a tip of said probe needles.” The Examiner asserts that these two limitations involve new matter because they do not have “proper support” in the specification as originally filed.

With regard to the first limitation, Applicants have amended claims 1 and 19-21 to state affirmatively that the cleaning layer contains additives. However, the additives are in amounts within a range in which the probe needle is not worn. The absence of wear is a key feature that is clearly expressed in the specification at several locations. Indeed, the Examiner admits that the specification does teach that the invention is “to provide a cleaning sheet that allows for removal of foreign matter without wearing off a probe needle when the foreign matter adhering on a probe needle of a probe card is removed and without causing re-adhering of the foreign matter that has once been removed from the needle and a transporting member having such a cleaning sheet and its production method” at paragraph [0007].

The Examiner states that there is disclosure at paragraph [0039] of additives “in amounts within the range in which the effects of the preset invention are not deteriorated that “if this is what Applicants intend to claim, please state so.” Applicants have amended claims 1 and 19-22 to incorporate such language.

Moreover, Applicants have added to claims 1, 19 and 21 the limitation that the cleaning layer has an initial elastic modulus within a range of 0.5-100 N/m² and is adapted to receive the probe needles and remove and retain the impurities such that there is no re-adhering of the foreign matter or the cleaning layer material on the probe needles. This is wholly consistent with the original disclosure of the application.

As to the second limitation, Applicants again respectfully submit that the original text at page 19, lines 18-24 that expressly teaches:

Since the cleaning layer of the present invention that contains a urethane polymer and a vinyl polymer allows the tip of the probe needle to be inserted therein to a sufficient depth and enables the removed foreign matter to be retained within the cleaning layer without fail, there will be no re-adhering of the foreign matter on the probe needle after the cleaning operation.

Clearly, there is support for the foreign materials being retained within the cleaning layer. Thus, the statement that the material is “adapted to receive penetrating probe needles and retain impurities on a tip of said probe needle” is supported and may be a basis for patentability over the prior art.

Claim Rejections - 35 U.S.C. §102

Claims 1-5, 7-11, 13, 16 and 19 are rejected under 35 U.S.C. §102(b) as being anticipated by Skinner et al (4,342,793). This rejection is traversed for at least the following reasons.

The Examiner substantially repeats the basis for rejection previously presented at page 4 of the Office action dated April 18, 2006. The Examiner adds at page 4 of the present Office Action the comment that the new limitation “does not contain additives that promote wear” is not a positively recited limitation and concludes that “since Skinner does not teach the use of an abrasive, the reference meets the requirement of this limitation.”

The Examiner similarly adds at page 5 of the present Office action the comment that the limitation “is adapted to receive...probe needles” is not positively recited. The Examiner asserts that the coatings of Skinner would be capable of being adapted to having the presently recited function because the coatings are solid surfaces and because they contain the same claimed materials.

Claims 1 and 19-21

The present invention, as now set forth in amended claims 1 and 19-21, is directed to the structure of a cleaning sheet for removing foreign matter adhering to the tip of a probe needle of a probe card. The cleaning layer contains a urethane polymer and a vinyl polymer, comprising an acrylic polymer. The composition of the mixture is selected and adapted such that when the probe needle is stuck into the cleaning layer 1, as shown in Fig. 3A, and is drawn out from the cleaning layer 1 as shown in Fig. 3B, (1) foreign matter on the probe needle is removed and (2) the material of the cleaning layer is not retained on the probe needle. Specifically, this motion allows foreign matter 23, such as aluminum oxide adhering to the tip of the needle, to remain in the cleaning layer and to be removed from the probe needle, as explained at pages 18 and 19. The probe needle is insertable to a sufficient depth that enables removal of the foreign matter,

while preventing wear or erosion of the probe needle tip. The thickness and elasticity of the cleaning layer are such that the foregoing cleaning can be achieved without leaving cleaning layer material on the probe needle tip. The thickness and elasticity ranges are expressly recited in the claim and the combination of these parameters along with the express composition of the materials and the expressly stated effects distinguish over Skinner et al.

Skinner et al

In again applying Skinner to the claimed invention at pages 4 and 5 of the Office Action, the Examiner notes that certain key features of the invention are implicitly disclosed.

No Abrasive

The Examiner notes that Skinner does not mention any abrasive. Thus, the Examiner asserts that there is none in the Skinner materials and the limitation is met. In light of the Examiner's position, the claim has been amended to state that the material "contains additives in amounts within a range in which the probe needle is not worn."

Cleaning Sheet for Removing

The Examiner states that the limitation related to a use for cleaning a probe is a "statement of use" for the material. Specifically, at page 4 of the Office Action, the limitation to a "cleaning sheet" is viewed as an intended use and the Examiner asserts that, in any event, the coatings in Skinner et al may be used for a variety of purposes including wiping debris from a probe needle.

The claims expressly recite that the layer is "adapted to receive penetrating probe needles and remove and retain impurities on a tip of said probe needle." Further, the claims now also state that there will be no re-adhering of the foreign matter or the cleaning layer material on the probe needle after the cleaning operation.

Applicants submit that these are structural and not use limitations. Further, Applicants respectfully submit that the Examiner has no basis for asserting that Skinner has such properties, as none are taught. Finally, Applicants submit that Skinner's curable coating is the cross-linked hard coating, thus, it is difficult to be used as a cleaning layer such as a cleaning layer of the present invention.

Claims 1, 2, 5, 7, 8 and 11-21 are rejected under 35 U.S.C. §102(b) as being anticipated by Grube (6,817,052). This rejection is traversed for at least the following reasons.

Again, the Examiner repeats the basis for rejection at pages 5 of the Office Action dated April 18, 2006 and adds at pages 5 and 6 of the present Office Action comments about the newly added limitations.

In particular, with regard to the limitation that the sheet “does not contain additives that promote wear,” the Examiner again notes that this is not positively recited and further observes that Grube also teaches that the cleaning pad can be made from a material having the substantially same hardness to that of the probe, in col. 9, lines 1-20. The Examiner concludes that the cleaning pad thus would not have additives that promote wear.

With respect to the limitation “adapted to receive.... probe needles,” the Examiner again notes that this is not positively recited and observes that Grube has an outer surface 302 that is capable of being adapted to have the recited functions because the coatings are solid surfaces and contain the same materials.

As previously noted with respect to the Skinner et al reference, the claims as now drafted would overcome this basis for rejection.

Claims 1 and 19-21

According to the present invention, the cleaning sheet can completely remove foreign matter from probe needles by using the cleaning sheet or transporting member without damaging or deforming the probe needles and that can prevent re-adhering of the foreign matter (cf. from line 24 on page 29 to line 3 on page 30 of this specification).

Grube

According to Grube's apparatuses for cleaning test probes, the probes may be slightly damaged or deformed, or may cause a problem with the “adhesive deposit” after cleaning, because Grube's apparatus includes an outer surface comprising a sticky material. Indeed, Grube teaches that debris on the probes will adhere to the sticky material as the roller is rolled across tips of the probes, and the probes are thereby cleaned. (cf. abstract in the Grube's specification)

Cleaning Sheet for Removing by Penetrating

Grube expressly concerns a cleaning sheet for removing debris from a probe tip, where the sheet comprises an outer surface layer 302 on a roller 204 attached to a support arm 202. Thus, the Examiner asserts that this feature is expressly met.

Applicants again note that the claim expressly requires a material that is “adapted to receive penetrating probe needles and remove and retain impurities on a tip of said probe needle,” and respectfully submit that this limitation would overcome this basis for rejection. As previously noted, Grube does not operate by penetration, but by rubbing the probe tips along the surface. Moreover, Grube requires use of an abrasive, which is consistent with having a tough outer layer that would prevent penetration by a probe.

The Examiner points to col. 9, lines 1-20 for a teaching that the tip penetrates the cleaning sheet. This teaching relates only to a two-step process where there is first abrasion by pressing and extracting against a pad, and then rubbing by the roller 204. The claimed composition is not disclosed with respect to the pad, which is simply an elastic base material and abrasive particles. There is no disclosure that the elastic material would be the composition as claimed. There is no penetration contemplated by the probes 104 into the roller 204. Only separate and distinct structures are contemplated, not an efficient and effective single structure requiring only a single step as in the present invention.

No Abrasive

The Examiner notes that the arm 202 supports a roller 204 and/or an abrasive roller or other surface, as taught at col. 12, lines 56-57. Given this statement of “alternative” roller structures, one of which can be abrasive, the Examiner concludes that roller 204 would not have an abrasive.

In reply, Applicants respectfully submit that the cleaning technique for Grube is to rub a surface of the roller against the probes (see Fig. 8), rather than to have the probes enter or penetrate the material. Thus, the materials in Grube are not intended to remove and retain the impurities. Again, as previously argued, the passage cited by the Examiner has to do with removing debris from a wafer, and not from the tips of probes. Thus, the presence of an abrasive

on the outer surface of one roller does not mean, implicitly or expressly, that there is no abrasive in the interior of any composition.

Claim Rejections - 35 U.S.C. § 103

Claims 3, 4, 6, 9 and 10 are rejected under 35 U.S.C. §103(a) as being unpatentable over Grube (6,817,052) in view of Skinner et al. Applicants would respectfully traverse this rejection for at least the following reasons.

The Examiner asserts that Grube teaches the limitations in the parent claims and that the admitted deficiency in the above referenced claims, namely a polyurethane being formed from a polyol and polyisocyanate, or that the polymeric mixture is cured by radiation, is taught by Skinner. The Examiner asserts that Skinner teaches such limitations in the abstract, and that the coating is free from solvent and fully crosslinked, at col. 2, lines 64-68.

Again, parent claim 1 specifies that the material “contains additives in amounts within a range in which the probe needle is not worn” and is “adapted to receive penetrating probe needles and remove and retain impurities on a tip of said probe needle.” Finally, the claims now also state that there will be no re-adhering of the foreign matter or the cleaning layer material on the probe needle after the cleaning operation. Clearly, on the basis of all of the foregoing limitations that expressly appear in the claims, the present invention intends to have the probe penetrate into the layer, rather than slide across it.

There is no question that Grube et al teaches directly opposite to the present invention and to Skinner et al. First, Grube requires use of an abrasive, which is consistent with having a tough outer layer that would prevent penetration by a probe. Second, to the extent that there is penetration of an abrasive layer in a first step, followed by a rubbing on a roller in a second step, there is a teaching away from the one-step process and structure of the present invention. Skinner is not combinable with Grube and, even if combined, does not satisfy the limitations in the claims.

New Claims

Applicants have added new claims 22-28, which recite a cleaning sheet with a cleaning layer that contains no additives. This feature is not taught in the prior art and is supported by the original disclosure.

As previously noted, the discussion of additives is presented at pages 11 and 12, where it is stated that:

The cleaning layer according to the present invention may as necessary contain those additives that are usually used, for example, antioxidants, fillers, pigments, colorants, flame retardants, antistatics, and ultraviolet absorbents in amounts within the range in which the effects of the present invention are not deteriorated.

The language clearly supports an optional addition of such additives and, thus, supports a claim that states that the cleaning layer contains no additives. As previously stated, the foregoing statement supports a range beginning with no additives and extending to a quantity of additives that does not provide abrasion of the probe and retention of the cleaning layer material on the probe. This result would be well understood by one skilled in the art.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

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Date: May 29, 2007